

CLAIMS

1. An optical wiring substrate comprising:
a substrate, having a plurality of recessed portions formed therein;
5 optical waveguides, formed on the substrate and positioned between the plurality of recessed portions;
a plurality of base members, each having
an inserted portion, in turn having inclined
surfaces formed thereon and being inserted into the
10 recessed portion, and
a supporting portion, supporting the
inserted portion inserted into the recessed portion;
photonic devices, each being mounted onto the inserted
portion of the base member and positioned at an inner side of the
15 recessed portion of the substrate;
penetration electrodes, each penetrating through from a base
member surface on which the photonic device is mounted to a base
member surface at the opposite side; and
reflecting surfaces, each formed on the inclined surface of
20 the inserted portion,
wherein the reflecting surfaces and the optical waveguides
are positioned by inserting the inserted portions of the base members
into the recessed portions, and
wherein the inclination angle of the reflecting surface being
25 adjusted to an angle, by which optical paths are matched between the
optical waveguide and the photonic devices.

2. The optical wiring substrate according to Claim 1,
wherein a photonic device, positioned at a recessed portion at
one end of the optical waveguide, is a light emitting element, and

5 a photonic device, positioned at a recessed portion at the
other end of the optical waveguide, is a photodetecting element.

3. The optical wiring substrate according to Claim 1,
wherein a light emitting element and a photodetecting
element are disposed as photonic devices in a single recessed portion.

10 4. The optical wiring substrate according to Claim 1,
wherein the photonic devices are mounted onto the base
member via a wiring substrate.

5. The optical wiring substrate according to Claim 1,
wherein the photonic devices are directly mounted on the
base member.

15 6. The optical wiring substrate according to Claim 1,
wherein the base members are silicon substrates.

7. The optical wiring substrate according to Claim 1,
wherein the inclined surfaces are formed by anisotropic
etching.

20 8. The optical wiring substrate according to Claim 1,
wherein the shapes of the inserted portions and the recessed
portions, as observed in the direction of looking into the recessed
portions, are polygonal shapes.

25 9. An optical wiring substrate manufacturing method
comprising the steps of:

forming optical waveguides on a substrate;

forming a plurality of recessed portions on the optical waveguides on the substrate;

manufacturing a plurality of base members, each having inclined surfaces formed thereon, the inclination angles of which are
5 adjusted to angles for matching optical paths between the optical waveguides and photonic devices, and having an inserted portion, inserted into the recessed portion, and a supporting portion, supported on a top surface of the substrate and supporting the inserted portion inserted into the recessed portion;

10 forming reflecting surfaces on the inclined surfaces;

disposing penetration electrodes, each penetrating through a surface of the base member onto which the photonic devices are mounted to a base member surface at the opposite side;

15 mounting the photonic devices, to be positioned in the recessed portions of the substrate, onto the inserted portions of the base members; and

inserting the inserted portions of the base members into the recessed portions and thereby positioning the reflecting surfaces and the optical waveguides.

20 10. The optical wiring substrate manufacturing method according to Claim 9,

wherein the base members are manufactured by forming a base material of base member, in which a plurality of base members are formed in continuation, and thereafter dicing the base material of
25 base member.

11. The optical wiring substrate manufacturing method

according to Claim 9, wherein the inclined surfaces of the base members are formed by anisotropic etching.

12. An optical wiring board comprising:

an optical waveguide substrate, having a plurality of recessed portions and optical waveguides that connect the recessed portions to each other;

base members, each having an inserted portion that closes the opening of a corresponding recessed portion and protrudes towards the bottom surface of the recessed portion;

photonic device substrates, each being mounted onto the top surface at the recessed portion side of the base member and having photonic devices; and

penetration electrodes, penetrating base members in the thickness direction and electrically connected to the photonic devices on the photonic device substrates;

side surface of the inserted portions being provided with reflecting films and the photonic devices and the optical waveguides being optically coupled via the reflecting films.